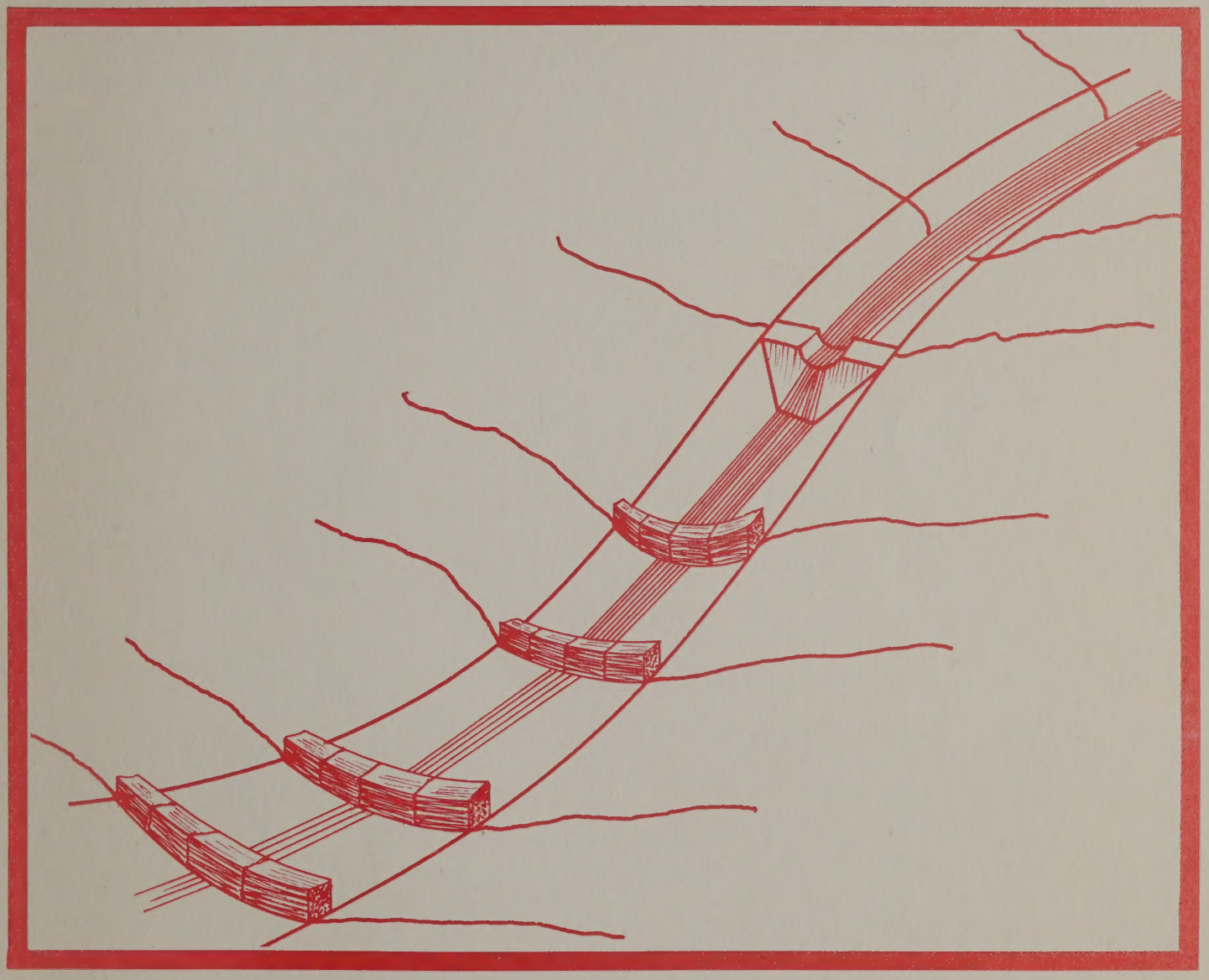
DEPARTMENT OF TRANSPORTATION
Raymond T. Schuler, commissioner

CONSTRUCTION
SUBDIVISION



construction guidelines for temporary erosion controls

APRIL 1974

CONSTRUCTION GUIDELINES

FOR

TEMPORARY EROSION CONTROLS

Prepared for

the

Construction Subdivision

by

Soil Mechanics Bureau
and
Landscape Bureau

STATE OF NEW YORK

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ACKNOWLEDGEMENTS

This manual was prepared jointly by the Soils Mechanics Bureau and the Landscape Bureau. Information contributing to the manual came from experiences of many Regional project engineers during the 1973 construction season, personal observations on projects throughout the State, and a review of control methods and devices utilized by other states and agencies.

INTRODUCTION

During the lifetime of a construction contract, soil erosion is a major contributor to environmental degradation. Temporary erosion control measures are utilized during construction to minimize the effects of sedimentation on the environment. Maximum controls are costly and are used mostly in sensitive areas. Permanent drainage features should be established as soon as possible to insure maximum protection.

The policy of the State of New York is to maintain reasonable standards of purity of the waters of the State consistent with public health, public enjoyment and industrial development. Also required is the use of all known available and reasonable methods to prevent or control the pollution of the waters of the State.

The Department has recognized its responsibility to maintain the purity of the waters in the State. Soon after preliminary location planning is completed interested outside agencies are contacted for comments on potential pollution from the proposed facility. This input from outside agencies is continued throughout the planning and design program. Areas sensitive to change in water quality are identified and special environmental controls are incorporated into the final plans.

The project engineer has Item 900, Temporary Work-Pollution Control, 1962 Specifications or Section 209, Temporary Soil Erosion and Water Pollution Control, 1973 Specifications to accomplish temporary erosion control work. These items are unique as considerable flexibility is delegated to the project engineer in determining the work to be done - what, where and when to utilize controls and how to pay for the work. Most project engineers have been learning to use temporary erosion controls by trial and error methods as few guides are available. During 1973, extensive discussions were conducted with the project engineers on the larger projects to determine the problems encountered and what they have found by experience to be successful installations. The Temporary Erosion and Sedimentation Controls for Construction section of this publication is intended to present a summary of the best field practices developed to date. The project engineer is the one upon whom the ultimate responsibility falls for enforcing the Department's goal of maintaining water quality. This manual is a guide to help fulfill this responsibility.

EROSION AND SEDIMENTATION

The process of sedimentation has been going on since the beginning of geologic time. Usually the process is so slow as to be nearly invisible. Catastrophic events such as landslides attract attention because of their relative rarity and large magnitude. Construction of transportation facilities attracts the attention of the public because of the acceleration of the sedimentation process which may accompany earth moving operations.

The sedimentation cycle consists of three parts: 1) erosion, 2) transport, and 3) deposition. Erosion or particle detachment occurs when an erodible soil is acted upon by energy forces of wind and water in excess of that required to move the material particles. Transport is the process of moving the material particles in a fluid medium. Deposition occurs when the forces of gravity and friction exceed the forces required to keep the particles in motion.

In order to have erosion, there must be a material capable of being eroded and an external force exceeding the force required to move the material. Materials capable of being eroded are high in fine sand and silt along with minor amounts of clay. As the gravel, stone and clay content increases the erosiveness decreases. All soils are susceptible to the erosive action of concentrated or high velocity water. Silt and fine sand soils are subjected to the highest degree of erosion; however, almost all soils in New York State have sufficient silt to cause turbidity. Rock cuts produce sufficient silt-sized particles from drilling and blasting to cause some turbidity. Wind will move fine sand and silt considerable distances.

Erosion accelerates whenever the protective cover of vegetation is removed. The vegetation acts as an anchor against surface forces such as wind and water action and as a cushion against the energy forces of falling rain. Remember, the best method to prevent erosion of bare soils is to reestablish vegetation as quickly as possible.

A bare soil which loses 100 pounds of sediment by erosion will lose only about 20 pounds if covered with mulch and will lose only 1 pound after sod is well established /1. Guides for application of landscape items for use in temporary erosion control are found in the Seeding and Mulching Guides. Control of erosion in ditches, channels or streams may be accomplished by avoiding large flow volumes and high velocities or by protecting the soil from the flowing water. This is done by flattening grades, lining channels, and using check dams.

Once erosion has occurred, the soil particles must be transported and deposited. This results in discolored water and sediment deposits. Temporary erosion controls are means to minimize the erosion and subsequent deposition resulting from frequently recurring rainfalls. Severe erosion

/1 Wischmeier, W. H. The Erosion Equation - A Tool for Conservation Planning: Proc. 26th Annual Meeting of Soil Conservation Society of America, 1971, pp. 73-78.

and deposition is normally associated with extreme rainfalls of only occasional occurrence. Under these conditions, temporary controls become less effective. Numerous large sediment basins and specialized chemical treatment would be required to prevent all discolored water from leaving a project. During these intense storms, turbid water carrying only clay-size particles flowing from a project would have little incremental effect on downstream turbidity and sedimentation.

DEVELOPMENT OF CONTROL MEASURES IN DESIGN

The Environmental Impact Statement for a transportation project obligates the Department to utilize erosion and sedimentation control measures to protect the environment. These obligations are translated into design details during the various design phases.

The following are examples of critical situations which may be encountered in transportation projects:

1. Watersheds for surface water supplies.

   Small watersheds are affected to a greater degree by construction activities than large watersheds.

2. Recreation waters.

   Discolored water, although not dangerous, looks bad and is undesirable at locations utilized for swimming, water skiing, etc.

3. Watersheds for fishing or fish propagation streams.

   Siltation and turbidity may permanently damage these streams.

4. School playgrounds, Parks, etc.

   Wind- or water-borne debris or soil can temporarily destroy the usefulness of these areas.

5. Areas of controlled drainage.

   Where runoff from construction areas must pass through small pipes or existing drain systems, the effectiveness of the drain systems can be destroyed by sedimentation of soil or debris. This often results in flooding and property damage.

The Highway Design Manual (Chapter 8) provides the Design Engineer with a check list for Erosion and Water Pollution Control. Items on this list are:

1. Flag critical watercourses
2. Incorporate sedimentation basins
3. Require early slope treatment
4. Cut-to-fill slope areas
5. Toe of slope ditches
6. Ditch lining treatment
7. Ditch transitions and junctions

8. Entrance to drainage inlet
9. Drainage outfall treatment
10. Temporary slope drains
11. Temporary stream crossings
12. Temporary stream diversions
13. Stage construction
14. Borrow pits - Disposal sites
15. Job access and haul roads

Chapter 8 of the Highway Design Manual recommends that erosion control measures be shown on the plans and contract documents to act as guides to the Engineer-in-Charge. Both design and construction personnel should recognize that the temporary erosion control details will require modification as determined by the construction sequence and seasonal weather variations.

TEMPORARY EROSION AND SEDIMENTATION CONTROL FOR CONSTRUCTION

The construction responsibility is to build the transportation facility while keeping sediment effects outside the project right of way to a practicable minimum. The project engineer should review the plans for all permanent and temporary erosion control details. In some cases the Contractor's sequence of work may make changes necessary. The examination of the plans should indicate the areas requiring spot treatment that require special care to prevent damage. Examples of spot treatment areas are cut to fill transitions, road crossings and drop inlets. If after a field inspection of the project, the project engineer determines a critical area exists which does not appear on the contract plans the design engineer should be queried.

Temporary control measures shall be applied to work areas off the right-of-way such as access roads, haul roads, borrow bits, and waste areas. The temporary work off the right-of-way is the responsibility of the Contractor and is performed by him at his expense in a manner approved by the Engineer.

Temporary measures are intended as supplementary to and are not to be performed in place of permanent control measures in the contract.

ADMINISTRATIVE GUIDES

A great deal of personal judgment is required to obtain optimum sediment controls without excessive cost. The location and method of control at spot locations and the remainder of the project must be worked out with the Contractor once his schedules, materials and equipment are identified. The following suggestions are included to assist in negotiations with the Contractor:

1. Obtain a copy of the final Environmental Impact Statement for the project.

2. Require installation of permanent erosion controls as soon as possible.

3. On large projects, require the Contractor to assign a single individual to be responsible for application of temporary erosion controls.

4. Require that prior to removal of ground cover, Contractor has sufficient stockpile of mulch and baled hay to be utilized as check dams or for mulching as needed. Clearing and grubbing operations often expose enough soil to start erosion problems.

5. Require that a hydroseeder and mulching machine be available on the project or on one week's maximum call so that seeding and mulching can be done on projects involving significant grading.

6. Require installation of temporary controls in areas of highly erodible soil which cannot reasonably be covered within a very short time (one week).

7. Periodically (weekly minimum) review progress of project with Contractor's designated representative or superintendent to determine if changed conditions require changes in temporary controls.

8. Review project conditions with Contractor's representative prior to expected periods of rain or work shut-down.

9. Review effectiveness of control devices and clean, remove or relocate as necessary between rainfalls.

RUNOFF CONTROL GUIDES

The following guides were developed from discussions with project engineers and observations of erosion control installations on numerous projects during the Summer of 1973.

Mulching and Seeding Cut and Fill Slopes

Early cover is the single most important erosion control method. See the Seeding and Mulching Guides for a detailed discussion.

Fill Slope Drains

Where large fills closely parallel streams, bodies of water or developed property a top of slope berm may be used to channelize water to a location where a slope drain removes the water. Use with care as any ponding conditions created by berms will soften the fill. A typical design is shown in Figure 1.

Cut-Fill Transitions

This is a difficult area for temporary erosion control installations since adjustments may have to be continuously made as the grades change in the cut and on the fill. However, treatment should not be neglected because of the nuisance factor since this area is often a significant source of sediment. A design detail is shown on Figure 2.

Toe of Fill Protection

Hay bales at the toe of fill are satisfactory to prevent sedimentation beyond the right-of-way if very low flow is expected (from fill slope only). If additional flow is expected (from cut or grade), the water will have to be channelized and treated as a ditch with the appropriate controls.

Channel Protection Materials

Areas of concentrated flow must be protected.

1) Install permanent protection where possible.

2) Stone fill may be used but is often costly (because of equipment and access). Stone must be of adequate size and shape. If the soil is fine sand or silt the underlying material will erode and the stone fill drops into the resulting depressions. In fine sand and silt soils a filter material must be utilized or a well-graded dumped stone used rather than a uniformly sized stone.

3) Plastic sheets, plastic filter cloth /2, flexible plastic pipe are good and in 1973 were relatively inexpensive. These materials require inlet and outlet controls and are placed with hand labor. Access is no problem.

4) Jute mesh, excelsior mats, asphalt and chemical stabilizers have been used with variable results.

Check Dams in Ditches

Either an impermeable or permeable dam may be built. Permeable dams of hay, rock or wood are preferred. A frequent shortcoming of the hay bale check dam is the fact that they do not extend high enough up the ditch side. This causes the impounded water to flow around the ends of the dam causing washouts.

Impermeable check dams may be built of soil, rock and soil, or plastic sheets and soil. These should have a formed spillway to prevent washout around the dam at high flow conditions. A downstream apron is also required in highly erodible soils. Washouts commonly add more sediment to the water than could be collected if the dam had functioned properly. See Figures 3 and 4.

Check Dams in Streams

Do not place temporary check dams in flowing streams since placement, cleaning and removal of the natural bed and bank protection of the stream may disrupt the complete steam pattern causing major erosion and sedimentation.

/2 Filter cloth is a plastic cloth with distinct openings, woven of monofilament yarns and treated after weaving so that the filaments retain their relative position with respect to each other. It may be utilized where there is a requirement to prevent the escape of retained soil by hydraulic action. A source of cloth of this type is the Erosion Control Division, Carthage Mills, Inc., 124 West 66th Street, Cincinnati, Ohio 45216 (Telephone No. 513-242-2740).

Temporary check dams in intermittent or low flow streams can usually be placed, cleaned and removed at periods of low or no flow so little or no sediment enters the main stream.

Sediment Traps in Ditches

The simplest trap is the pit-type trap which is merely a hole in the ditch bottom. Little is known about the design of the pit-type sediment trap except that the length and depth are dependent on soil type, watershed area, gradient, rainfall estimates and clean-out frequency. Experience has shown that sediment traps in ditches are ineffective. High flows pass over with little or no effect. While they are easy to construct and maintain they leave soft, soggy areas when removed.

Sediment Basins

These are the largest and most complex of the temporary erosion controls. Sediment basins are designed for size in accordance with the hydraulic requirements shown in Chapter 8 of the Highway Design Manual. The use of sediment basins should be reserved for critical situations (such as drainage into surface water supplies) and should be considered a back-up safety device if other controls on the project fail.

Sediment basins permit sedimentation of coarse soils only as silt and clay-sized particles remain in suspension. Other agencies have used chemical flocculating agents (generally alum) to remove the discoloration from the remaining water in the basins. This is not recommended as overtreatment can be damaging to the water quality downstream by trading physical discoloration for chemical pollution.

The project engineer should check to see if sufficient right-of-way has been included for access of equipment to clean the basin periodically. Basins should be cleaned whenever one foot or more of sediment has accumulated on the floor. Removal should be accomplished in such a manner so as not to introduce sediment into the adjacent watercourse.

When no longer needed sediment basins should be removed or backfilled and the site properly restored.

GUIDES TO WORK IN STREAMS AND LAKES

Temporary Stream Crossings

1. No temporary stream crossing should be permitted that would cause a backup of water and flooding if heavy rains occurred.

2. The materials used to construct temporary stream crossings should be clean gravel or rock.

3. The size of the waterway through the temporary crossing should be a function of the potential damage which could occur from upstream flooding or from washouts.

4. Temporary stream crossings with less waterway than the permanent facility should be removed at the close of the construction season.

Temporary Stream Relocations

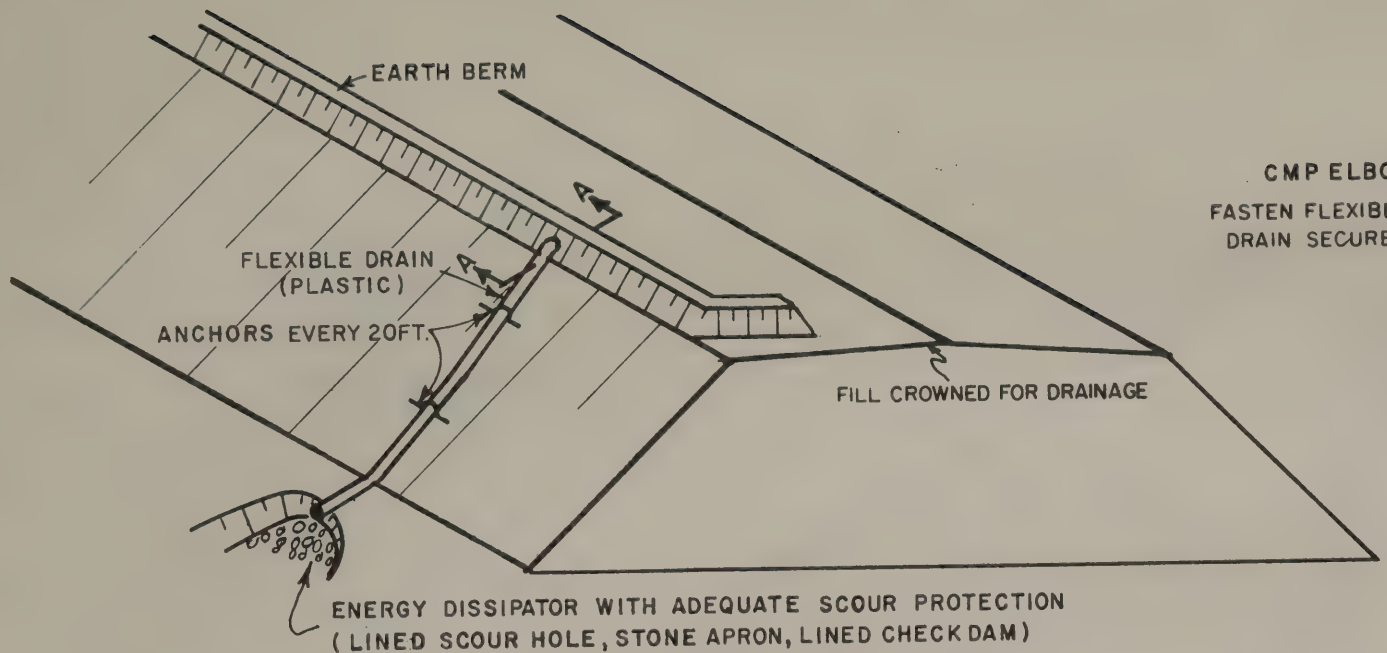
1. The waterway size and the temporary erosion protection required for a temporary stream relocation should be shown on the plans. If not, request the appropriate information from the designer.

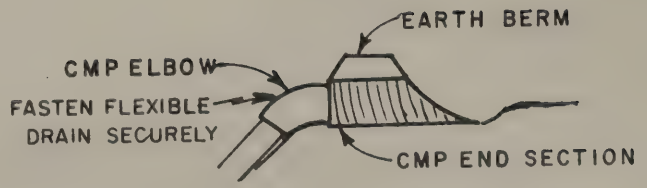
2. Placement and removal of plugs shall be carried out in such a way as to reduce or eliminate sediment. This can best be obtained by placing an artificial plug of clean materials across the upstream temporary channel opening so that all natural soil can be excavated in the dry. The plugging of the old stream channel should be accomplished with clean materials (sand bags or clean gravel).

Pier Construction

When construction is to be carried out in a flowing stream, the materials to be used for temporary access roads or working platforms shall be clean gravel or rock. If a cofferdam is constructed for placement of footings below water level, the cofferdam should be sealed to reduce the amount of water flowing into the area to be excavated. This will reduce the quantity of muddy water which must be treated before reentry into the natural stream.

At bridge crossings a log boom across the downstream portion of the worksite will catch floating debris from the work area. In some cases burlap and other absorbent materials can be used to collect liquid pollutants such as paint and oil.





SECTION A-A

NOTES: 1.) Use on large fills closely paralleling streams or other critical areas.

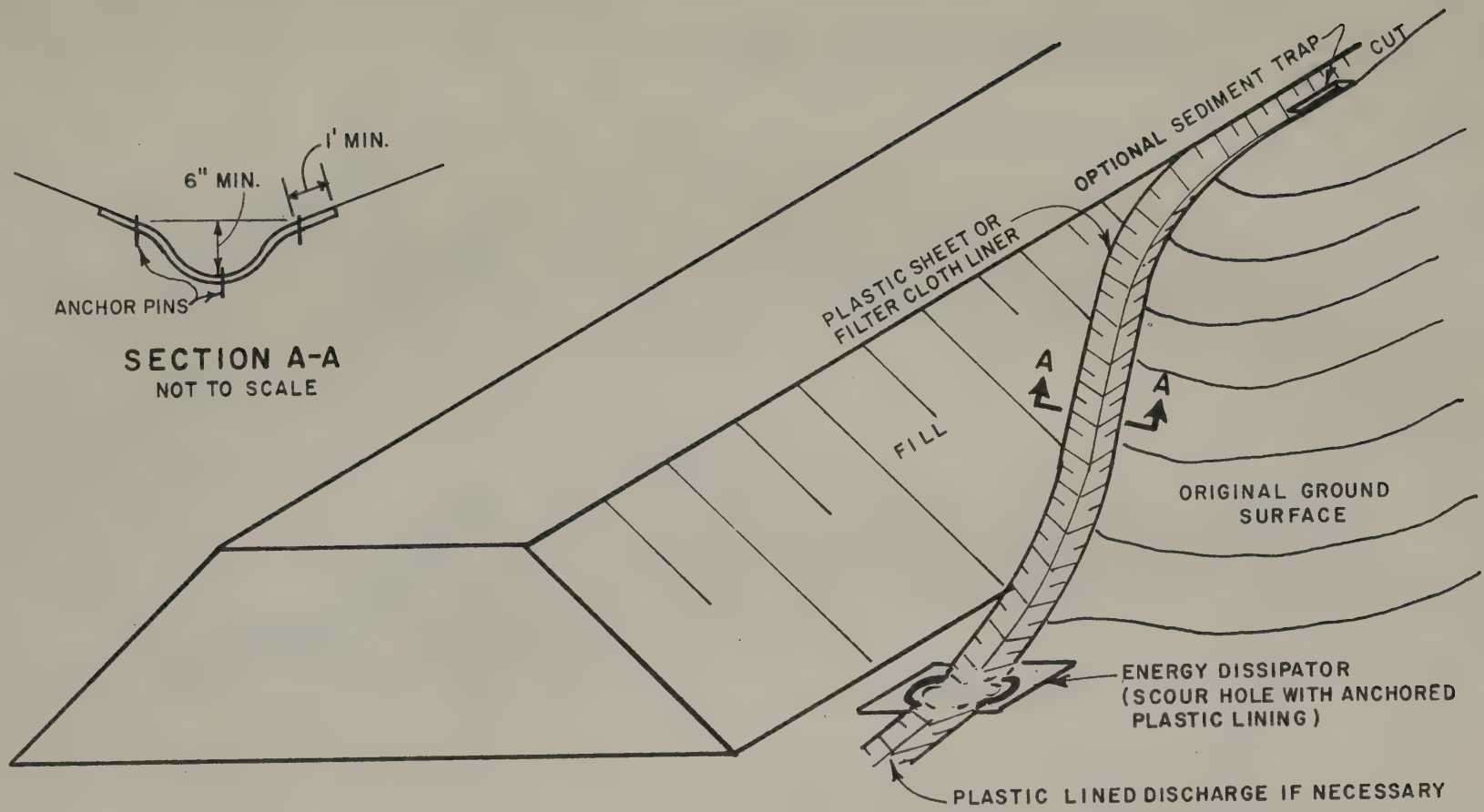
2.) Locate down drain in an area with adequate space to dissipate energy and collect sediment before discharging into the stream.

3.) If the embankment is highly erodible, a sediment trap should be used at the inlet or outlet of the slope drain.

4.) Earth berm should be high enough to prevent washout of slope drain.

TEMPORARY FLEXIBLE SLOPE DRAIN

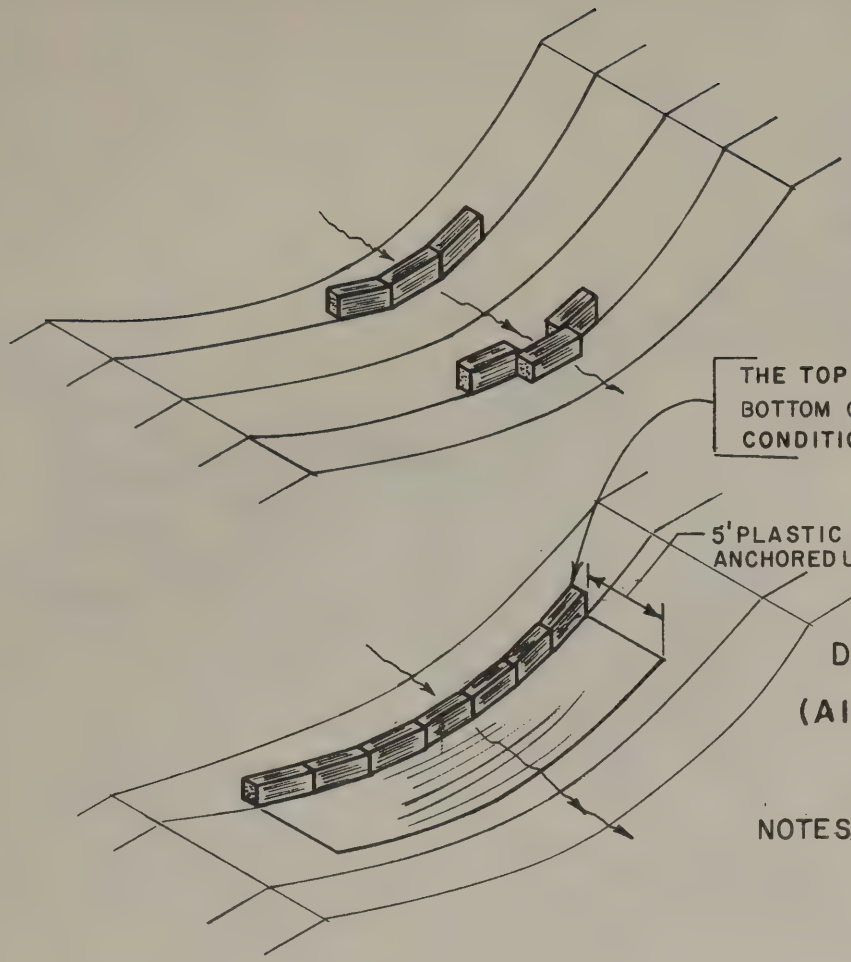
FIGURE 1



NOTE: Inlet to plastic liner must be dug in 2'± and set back 5'± above the change in slope and may have to be relocated as the cut progresses.

TRANSITION FROM CUT TO FILL
TEMPORARY TREATMENT

FIGURE 2



SHALLOW DITCH - LOW FLOW

THE TOP OF THE CENTER BALE MUST BE 6" MIN. BELOW THE BOTTOM OF THE END BALES TO PROVIDE A WEIR FOR HIGH FLOW CONDITIONS.

5' PLASTIC APRON ANCHORED UNDER BALES

DEEP DITCH OR INTERMITTANT STREAMS

(Also may be used for culvert inlet protection)

NOTES: 1.) Dig bales in 2"± (more for soft ground).

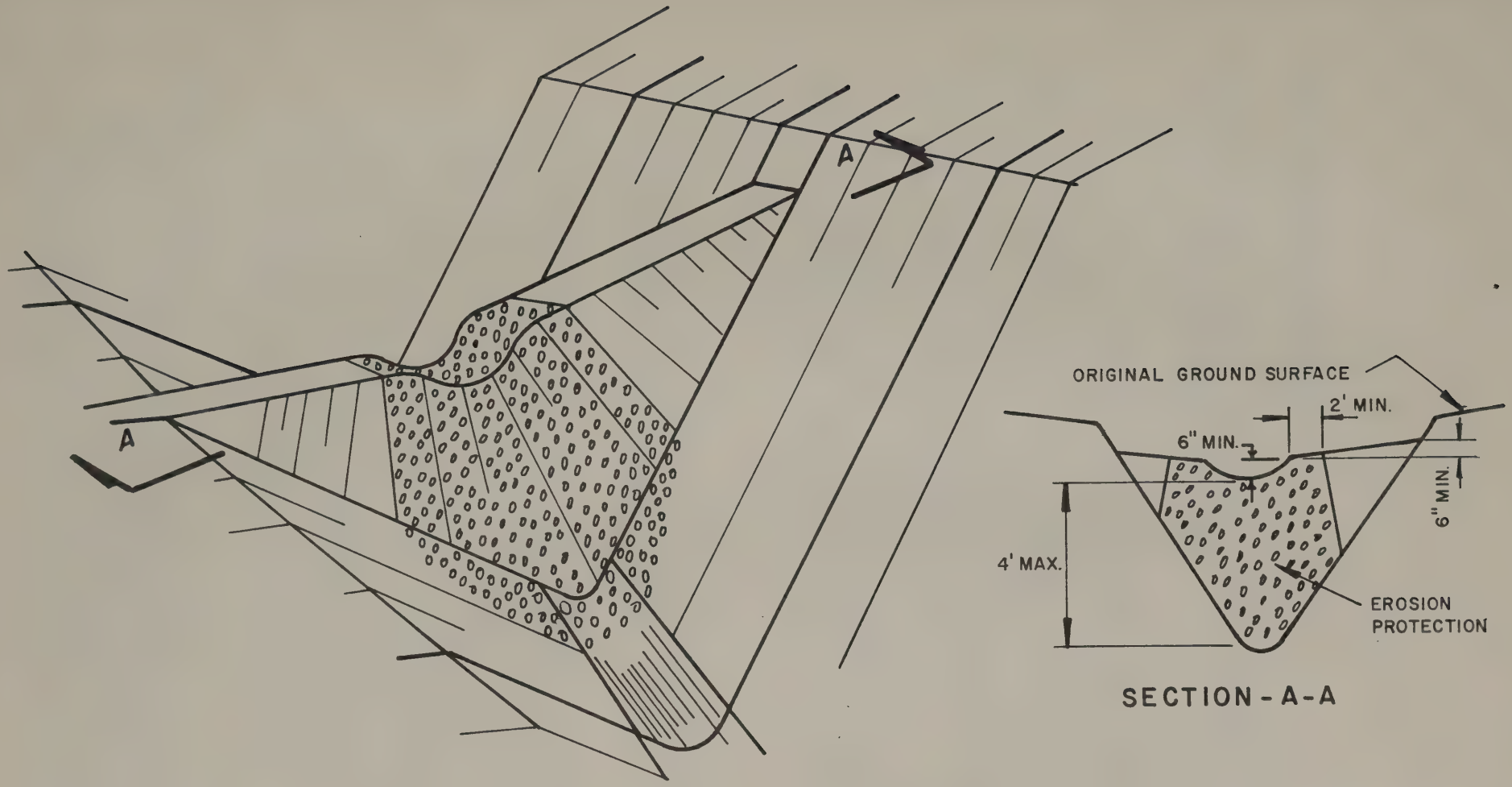
2.) Stake all bales to resist water forces.

3.) Hay bales should extend far enough up slope to prevent water from flowing around ends and causing washout.

4.) Hay bales collect oil under low flow conditions. May be used in drainage channels from maintenance areas.

HAY BALE CHECK DAMS

FIGURE 3



SECTION - A-A

NOTES: 1.) Erosion protection for earth fill check dams.
a.) 1 ft. min. thickness of stone
2ft. min. beyond both sides of shaped spillway
b.) For plastic sheet or filter cloth erosion protection use 2 ft. min. beyond both sides of shaped spillway and 5 ft. upstream and downstream of dam.

2.) If high flow conditions could top the complete dam, erosion protection should be carried completely across the dam and 5 ft. up and down stream.

IMPERMEABLE CHECK DAMS
FIGURE 4

SEEDING AND MULCHING GUIDES

The following discussion of controlling erosion by seeding and mulching is only concerned with surface erosion. Slope failures caused by internal water or unstable soils cannot be corrected by surface treatments as discussed in this section.

One of the most effective ways to control surface soil erosion is to establish a vegetative cover, usually grass, on recently graded earth areas. This work can be accomplished under the permanent seeding item in the contract or by temporary seeding and mulching (or by mulching only) under Section 209 - Temporary Soil Erosion and Water Pollution Control, depending largely whether or not final grade has been reached. The following discussion of permanent seeding and temporary seeding and how they can be used under various contract conditions is offered as a guide for the Engineer-in-Charge.

Unless otherwise noted, reference to "permanent seeding" or "temporary seeding" is intended to mean the complete operation of applying seed, fertilizer and mulch. In certain situations mulching as a separate operation is recommended and is so noted in the discussion.

Permanent Seeding

Section 203-3.03 Scheduling of Work to Minimize Soil Erosion and Water Pollution requires the Contractor to prepare schedules to perform permanent erosion control work at the earliest possible time during the course of construction.

Wherever possible, the Contractor is required to bring graded areas to final line and grade and to perform the final trimming operations and the permanent seeding as the project is progressed. If for some reason the actual seeding cannot be accomplished when the area is trimmed, the mulching can be done as specified under the seeding item to protect against erosion and the seed and fertilizer applied on the mulch as soon as possible. Under no circumstances should the final trimming of slopes and the permanent seeding be delayed until the entire project is trimmed. The permanent seeding should be accomplished as soon as the grading is completed so that only small areas will be left for the final stages of the contract. More detailed guidelines and discussion of permanent seeding are given under the headings "Cut Slopes" and "Fill Slopes."

Temporary Seeding

Temporary seeding under Section 209 - Temporary Soil Erosion and Water Pollution Control should be used only where the final grade and trimming cannot be accomplished and the exposed earth would be left unprotected for a considerable period of time. It should never be used where it is practical for the Contractor to reach the final grades and to perform the permanent seeding, fertilizing and mulching

operations. Those areas on which temporary seeding has been done and on which permanent seeding is scheduled, must be prepared for the permanent seeding by scarification and other appropriate measures as ordered by the Engineer.

There are a number of situations where temporary seeding (or mulching alone) should be considered. As an example, weather or other causes of delays in a work schedule may make it impossible to complete grading and trimming during the fall months so that those areas will have to "overwinter" until work can resume in the late spring. In such situations, temporary seeding under Section 209 - Temporary Soil Erosion and Water Pollution Control should be done providing the work can be done at a time of year when seed germination and growth can be expected.

If the season is so late that no growth from seeding can be expected, the graded areas should be mulched under Item 209 - Temporary Soil Erosion and Water Pollution Control to provide temporary erosion control until the final trim can be obtained and the permanent seeding accomplished.

Temporary seeding is discussed in more detail under the headings "Cut Slopes" and "Fill Slopes."

Trimming

The quality of the trim considered satisfactory for seeding and mulching operations has been subject to numerous interpretations. Personnel in charge of construction should be aware of the objectives of trimming operations and of the qualities that are acceptable as the success of permanent erosion control measures of seeding and mulching are somewhat dependent on the proper trim.

1. In general, a machine trim obtained by such equipment as bull-dozers, graders, drags and chains, all of which can be operated on highway cuts and fills, is satisfactory. On gentle slopes or level areas, equipment such as power rakes are often used to obtain a smooth trim. It should be noted that this quality of trim is not required by our specifications except where specified and is acceptable unless it is too smooth for a seed bed. A certain degree of "roughness" of the surface makes for a better seed bed as it assists in seed lodgement and germination.

2. In urban areas, and in particular those areas that will be closely mown and maintained, a higher quality trim is required. Where the grading is adjacent to lawns, hand raking to obtain a trim equal to the adjoining area should be required.

3. Hand raking to remove stones and other debris should not be permitted on 1 on 2 cuts and fills. A machine trim will be completely satisfactory as a "rough" trim provides a better seed bed.

4. It is important to remember that seeding and mulching (or only the mulching) should be done as soon as the grading is completed when the surface is loose and friable. If a surface crust has formed, the areas must be scarified immediately before seeding.

The following discussion of situations where either permanent or temporary erosion control may be used is offered as a guide for the Engineer in Charge:

Cut Slopes

If the permanent seeding is to be done on the existing soils (that is without topsoil) the seeding should be accomplished as the cut is progressed and final grade reached. It is recommended that as soon as a maximum of 40' of cut slope (measured on the slope) is completed, the slope be trimmed, scarified if necessary as determined by the Engineer and seeded. This is illustrated in Figure 5. If seeding dates are specified and the slope is trimmed "out of seeding season," the area can be mulched as specified for the permanent seeding item and the seed and fertilizer applied on top of the mulch in the next seeding season. The mulch cover must be maintained and any areas where the mulch has been lost must be re-mulched prior to applying the permanent seed and fertilizer.

Cut slopes which are less than 40' in length upon completion should be trimmed, seeded, fertilized and mulched (or mulched only as noted above) as soon as the cut is brought to final grade. This is also illustrated in Figure 5. If seeding dates are specified and the slope is trimmed "out of seeding season," the area can be mulched as specified under the permanent seeding item and the seed and fertilizer applied on the mulch in the next seeding season.

Hay or straw mulches are subject to blowing and usually should be anchored by applying an asphalt emulsion, Section 702-32, at the rate of 200 gallons to 300 gallons per acre.

If there is some reason a cut cannot be brought to final grade and must remain uncompleted for a period of time, it should be mulched under Section 209 - Temporary Soil Erosion and Water Pollution Control. Under certain conditions, temporary seeding may be advisable, particularly if the cut is to remain in an unfinished condition for an extended period of time and the season of the year will permit germination and growth.

When topsoil is specified on the cut slopes, the Contractor should place the topsoil as the cut is progressed, using the same increment of slope length (40') as noted above. If this is not practical in the judgement of the Engineer, the area should be mulched under Section 209 - Temporary Soil Erosion and Water Pollution Control to provide temporary erosion control until the topsoil can be spread and

the permanent seeding done. Temporary seeding may also be used in special circumstances or where a cut cannot be brought to final grade and trimmed for a relatively long period of time. Both of these situations will depend on the season of the year and whether the seed will germinate and grow. Areas which have been temporarily mulched or seeded will generally have to be scarified prior to topsoiling to enable a bonding between the topsoil and the subgrade.

Fill Slopes

The permanent erosion control measures of seeding and mulching (and topsoiling where specified) of fill slopes are usually not carried out until the fill is up to subgrade. In the majority of cases when the fill is up to pavement subgrade, the slope should be trimmed and the permanent seeding and mulching carried out. Some spillage of the subbase courses of granular material over the seeded areas may require minor retrimming and reseeding. Where a long fill is constructed in stages, the final trimming and the permanent seeding, fertilizing, and mulching should be done as sections of the fill are completed without waiting for the entire length of fill to be brought up to subgrade. If seeding dates are specified and the trim is completed "out of seeding season," the area can be mulched as specified for the permanent seeding item in the contract and the permanent seeding and fertilizing done over the mulch in the next seeding season. This is illustrated in Figure 6.

In special situations where the fill cannot be brought to final subgrade in a reasonable length of time, or the final trim cannot be obtained, or the project must overwinter, exposed fill slopes should be mulched with hay or straw under Section 209 - Temporary Erosion and Water Pollution Control.

Fills adjacent to streams, lakes, ponds or reservoirs are a source of contamination and must be protected at all times. Mulching under Section 209 - Temporary Soil Erosion and Water Pollution Control, in conjunction with other erosion control measures, should be carried out as these fills are progressed and not delayed until the fills are complete. Extra protection against erosion can be obtained where necessary by using jute mesh to cover the mulch and hold it in place. Additional protection against contamination may be obtained by the use of bales of hay or straw. Figure 7 illustrates these points.

Borrow and Spoil Areas

The treatment of borrow and spoil areas both on and off the right of way is covered in Section 107 - Restoration of Disturbed Areas Outside the Right of Way, Section 107-11 - Restoration of Disturbed Areas Within the Right of Way, and Section 209 - Temporary Soil Erosion and Water Pollution Control.

When the Contractor completes his operations on a portion of a borrow pit or a spoil area, that portion should be seeded and mulched as provided for in the contract without waiting for the entire borrow or spoil operation to be completed.

If for some reason all or portions of borrow pits or spoil areas must remain "open" for a period of time such as overwinter or due to delays in contract operations, the exposed pit or spoil areas should be rough graded and protected against erosion by temporary seeding and mulching or by mulching alone as discussed under "Temporary Seeding."

NOTES:

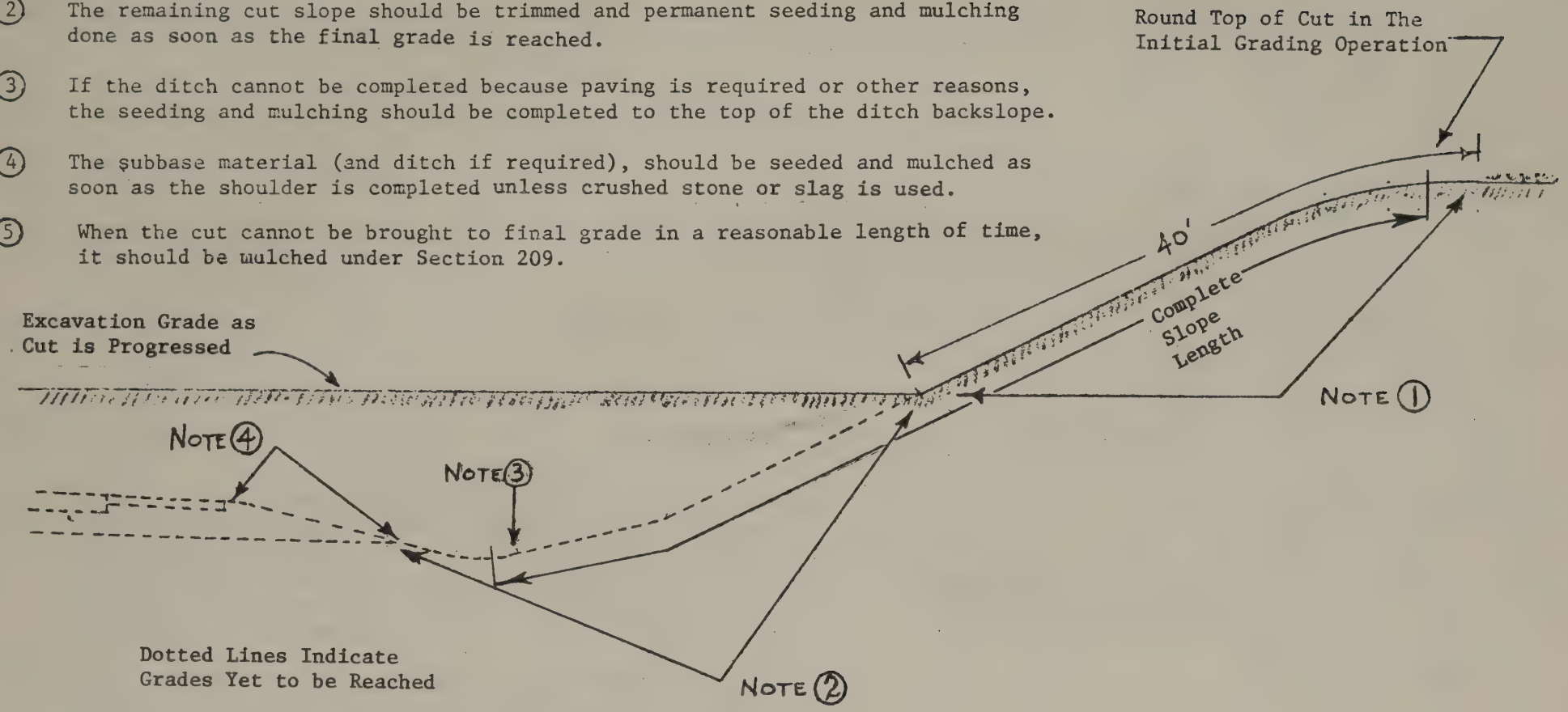
1. When 40' of cut slope has been completed, the slope should be trimmed and the permanent erosion control measures of seeding and mulching should be carried out. If seeding dates are specified and the cut is trimmed "out of season," mulch the slope as specified in the seeding item and seed on top of the mulch in the next seeding season.

2. The remaining cut slope should be trimmed and permanent seeding and mulching done as soon as the final grade is reached.

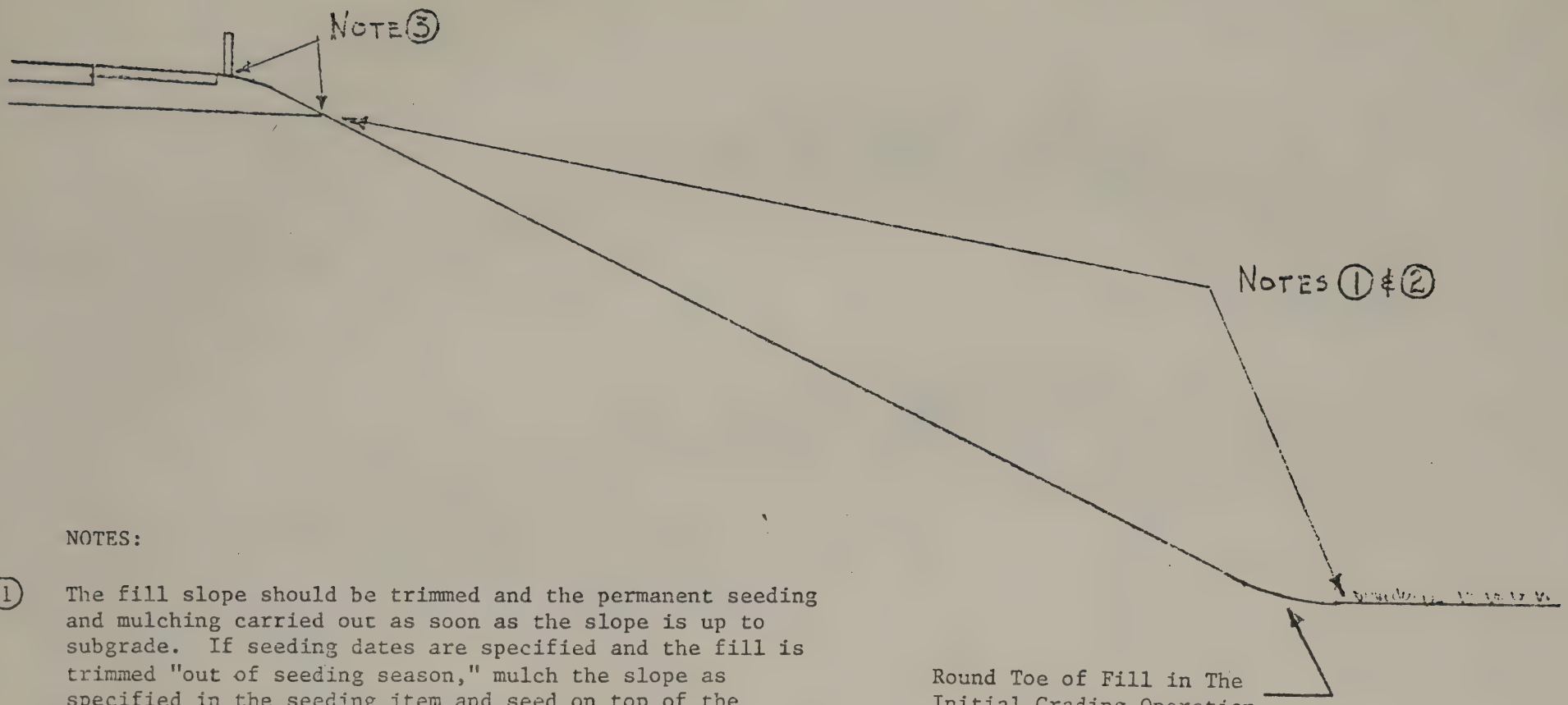
3. If the ditch cannot be completed because paving is required or other reasons, the seeding and mulching should be completed to the top of the ditch backslope.

4. The subbase material (and ditch if required), should be seeded and mulched as soon as the shoulder is completed unless crushed stone or slag is used.

5. When the cut cannot be brought to final grade in a reasonable length of time, it should be mulched under Section 209.



SEEDING AND MULCHING GUIDES
CUT SLOPES
FIGURE 5



NOTES:

① The fill slope should be trimmed and the permanent seeding and mulching carried out as soon as the slope is up to subgrade. If seeding dates are specified and the fill is trimmed "out of seeding season," mulch the slope as specified in the seeding item and seed on top of the mulch in the next seeding season.

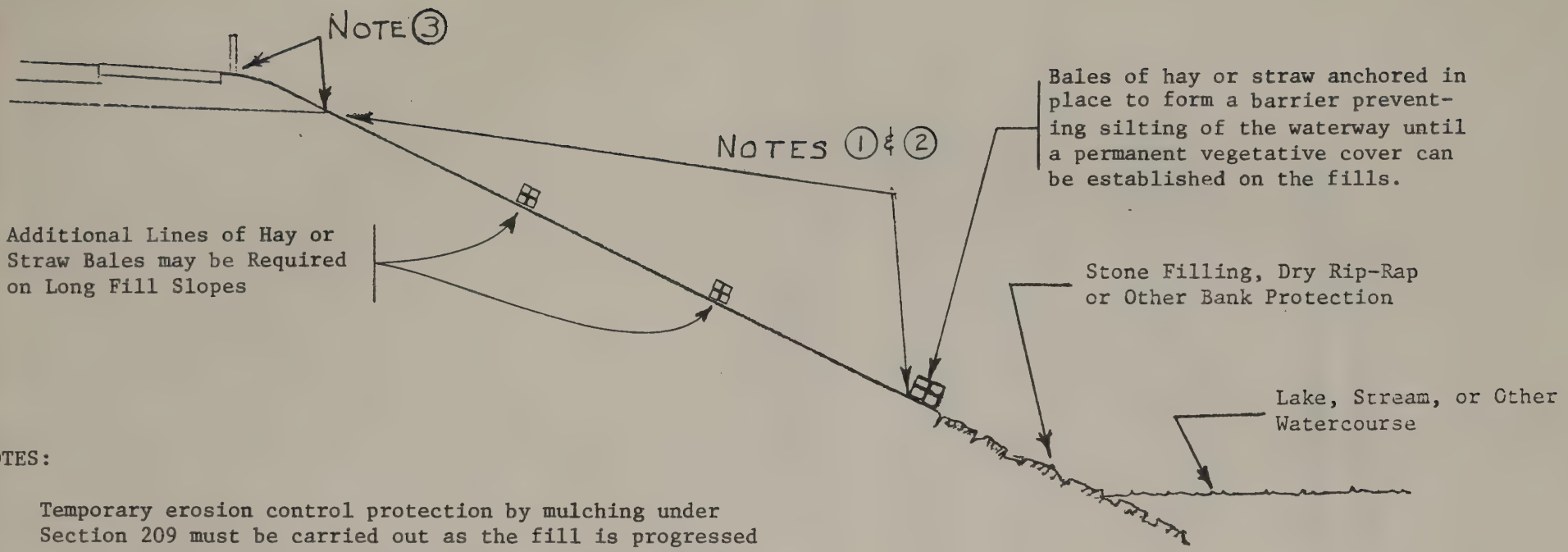
② When the fill cannot be brought to subgrade or the final trim cannot be obtained in a reasonable length of time, temporary erosion control by mulching under Section 209 should be required.

③ The subbase material should be seeded and mulched as soon as the shoulder is completed unless crushed stone or slag is used.

SEEDING AND MULCHING GUIDES

FILL SLOPES

FIGURE 6



NOTES:

① Temporary erosion control protection by mulching under Section 209 must be carried out as the fill is progressed to avoid all possible contamination of the lake, stream, or other watercourse. Placement of jute mesh over the mulch is recommended to provide positive "tacking" of the mulch and increased protection against erosion.

② Permanent erosion control by seeding and mulching should be done as soon as the fill is brought to subgrade.

③ The subbase material should be seeded and mulched as soon as the shoulder is completed unless crushed stone or slag is used.

SEEDING AND MULCHING GUIDES

FILLS ADJACENT TO LAKES, STREAMS AND OTHER WATERCOURSES

FIGURE 7

LIST OF DOT INSTRUCTIONS

PERTAINING TO TEMPORARY EROSION CONTROL

1. 2/1/73 N.Y.S. Engineering Instruction 73-4, states prior authorization is necessary for agreed price or force account work under Item 900. Orders on contracts are required only when the total cost of all additional work exceeds the amount bid for Item 900.

2. 10/5/71 N.Y.S. Instruction No. 71-60, was issued to correct pollution control deficiencies on ongoing projects listed in a report prepared by the Federal Highway Administration.

3. 3/22/71 N.Y.S. Chief Engineer's Instruction No. 71-2, contained instructions to designers to include in each design provisions to eliminate or minimize soil erosion and water pollution.

4. 9/25/70 N.Y.S. Instruction No. 70-31.2, contained revised specifications for Item 900 and copies of a special note amending Addenda No. 49, Pages 13 and 14.